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# A New Species of *Hymenocallis* (Amaryllidaceae) from the Apalachicola Forest of the Florida Panhandle, U.S.A.

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**ABSTRACT.** A new species, *Hymenocallis gholsonii* G. Lom. Smith & Garland (Amaryllidaceae), is described and illustrated. It is a rare endemic that occurs along a stream and its branches in the Apalachicola National Forest, in Liberty County, Florida, U.S.A. Its robust bulbs, narrowly oblanceolate, green-yellow leaves, and robust perianth tubes distinguish it from the allied *H. choctawensis* Traub, which has more slender bulbs, shiny green, prominently oblanceolate leaves, and slender perianth tubes.

**Key words:** Amaryllidaceae, Florida Panhandle, *Hymenocallis*, IUCN Red List, United States.

In the United States, the genus *Hymenocallis* Salisbury (Amaryllidaceae) is most diverse in the Florida Panhandle. Within a 50-mile radius of Tallahassee, Leon County, in the central panhandle, can be found seven of the 15 U.S. species of *Hymenocallis* in their native habitats: *H. choctawensis* Traub, *H. duvalensis* Traub, *H. franklinensis* G. Lom. Smith, L. C. Anderson & Flory, *H. godfreyi* G. Lom. Smith & Darst, *H. henryae* Traub, *H. occidentalis* (Leconte) Kunth, and *H. rotata* (Ker Gawler) Herbert (Smith & Flory, 2002; Smith & Garland, 2003). Small (1933) and Traub (1962) indicated that *H. latifolia* (Miller) M. Roemer [= *H. kimballiae* Small] may have naturalized in coastal areas near Apalachicola, Franklin County. This remarkable diversity of *Hymenocallis* species in the central Florida Panhandle presents botanists with challenging problems of identification.

The *Hymenocallis* species with smaller ovaries (0.7–1.5 cm × 5–10 mm) and fewer ovules (1 to 3) are especially challenging to identify. Smith and Garland (1996) provided a key to identify three such species, *H. choctawensis*, *H. duvalensis*, and *H. occidentalis*, using leaf and bulb characteristics. Smith et al. (2001) added to this group when they described a new species, *H. franklinensis*, from the lower Ochlockonee River and its tributaries. *Hymenocallis franklinensis* is considered to be closely allied to *H. choctawensis*, but differs from that species by its liguliform or narrowly oblanceolate

leaves, lanceolate scape bracts that taper in the distal half, and smaller subglobose fruits. *Hymenocallis franklinensis* differs from *H. gholsonii* G. Lom. Smith & Garland, newly introduced here, by its lustrous, green leaves, narrowly tapering scape bracts, slender perianth tubes, and smaller staminal cups. An ongoing phylogenetic study using both morphological and intersimple sequence repeat (ISSR) markers has revealed in a neighbor-joining analysis that *H. choctawensis* and *H. franklinensis* form a sister relationship and that *H. gholsonii* is sister to that relationship (Catherine Bush and Dollie Rollins, pers. comm.).

In 1991, Loran C. Anderson, then curator of the Florida State University Herbarium (FSU), called to the senior author's attention a puzzling specimen that John Palis of the Florida Natural Areas Inventory had collected in the Apalachicola National Forest near the town of Sumatra. This specimen had features similar to *Hymenocallis choctawensis*, but its perianth tubes were decidedly shorter and more robust, its staminal cup was larger, and its leaves were not distinctly oblanceolate but liguliform or narrowly oblanceolate.

It was not until spring of 2004 that the authors began to study intensively the Sumatra population. We were intrigued by the characteristics of this population and planned a critical analysis of both reproductive and vegetative characteristics. In 2005, the authors returned to this population, finding a number of plants at peak anthesis. We made careful observations and measurements, selected several choice flowering specimens as vouchers, and collected living bulbs for cytological analyses. In 2006, the senior author, with botanical associates, including Angus Gholson, returned to the population. We made additional observations on fruit development and seed production and compiled a comprehensive list of associated plants (see Distribution and ecological associates below).

Distinguishing characteristics of the new species include the relatively short, robust perianth tubes; a staminal cup that is relatively large (as compared to *H.*



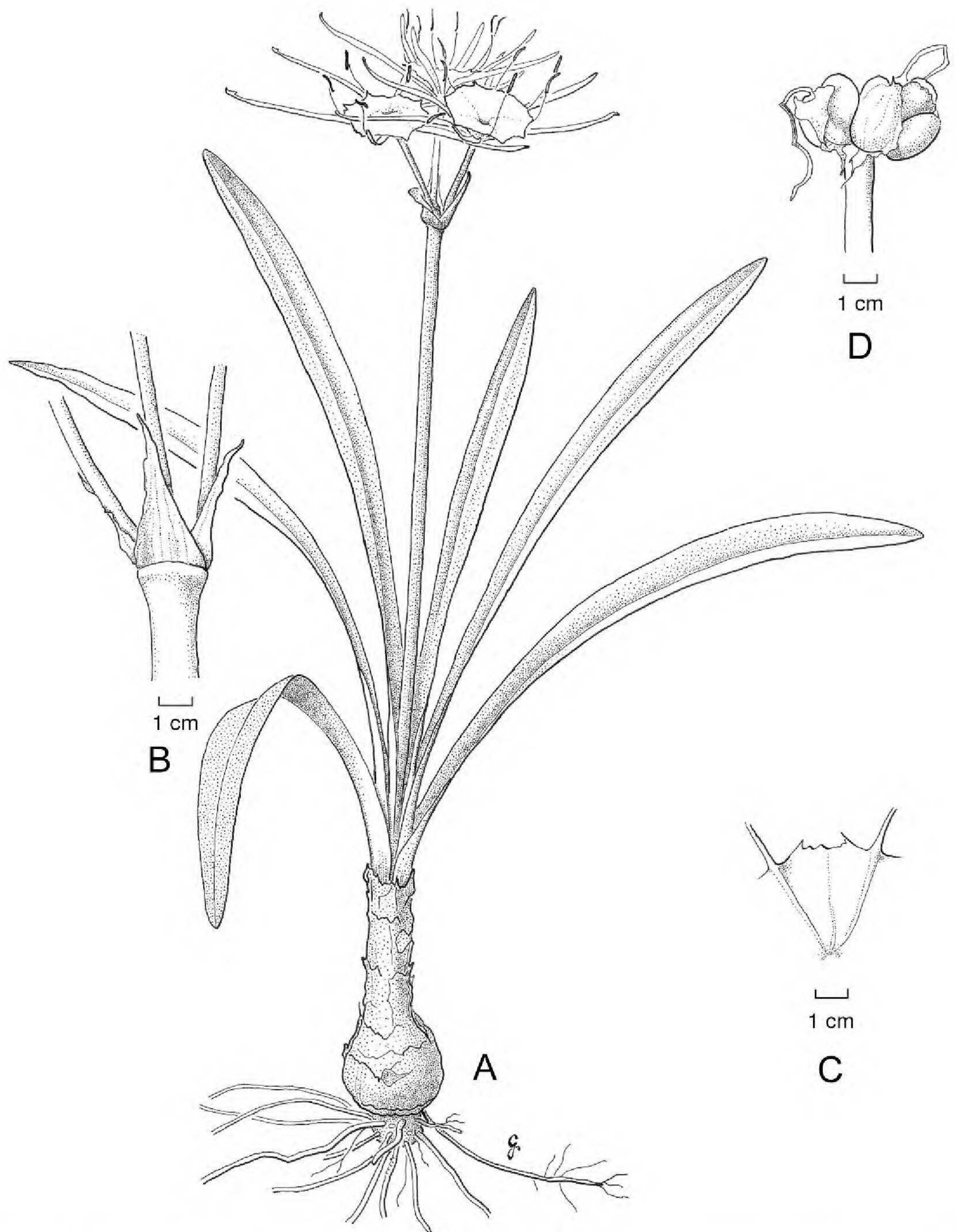


Figure 1. *Hymenocallis gholsonii* G. Lom. Smith & Garland. —A. Habit and scape with 3-flowered inflorescence. —B. Scape with bracts and bracteoles. —C. Section of staminal cup between free filaments. —D. Dehiscing capsule with seeds. (Drawn by Mark A. Garland based on *Smith & Garland 1784*.)

*choctawensis*) and rotate at peak anthesis; relatively large, lanceolate scape bracts; green-yellow, nearly erect, liguliform or narrowly oblanceolate leaves; and the robust, rhizomatous bulb.

***Hymenocallis gholsonii*** G. Lom. Smith & Garland, sp. nov. TYPE: U.S.A. Florida: Liberty Co., stream in the Sumatra area, Apalachicola Natl. Forest, 7 Apr. 1991, *Palis s.n.* (holotype, FSU). Figure 1.



*Hymenocallidi choctawensi* Traub affinis sed ab ea bulbo robustiore, foliis flavoviridibus suberectis liguliformibus vel anguste oblanceolatis, bracteis scapi magnis lanceolatis, tubis perianthii brevioribus robustioribus, poculo staminorum majore sub plena anthesi rotato et numero chromosomatum:  $2n = 44$  (bibrachiatorum 34, telocentricorum 10) distinguenda.

Bulb rhizomatous, robustly ovoid,  $4.5\text{--}7.5 \times 2.5\text{--}5.5$  cm, neck 6–11 cm, basal plate 2–3 cm; tunica grayish brown. Leaves 3 to 9, erect to suberect, yellow-green, lustrous, liguliform to narrowly oblanceolate, prominently channeled,  $4\text{--}6.5$  dm  $\times$   $2\text{--}4$  cm, coriaceous, apex acute. Scape 2.7–4.3 dm, 2-edged, glaucous; 2 papery scape bracts enclosing the buds,  $4\text{--}5 \times 1.5\text{--}2$  cm; each flower with a subtending bracteole, persistent,  $3\text{--}4 \times \text{ca. } 1$  cm. Flowers 2 or 3, opening sequentially, fragrant; perianth segments radiating horizontally to slightly ascending, white, tinged green on keel,  $9\text{--}11.5$  cm  $\times$   $7\text{--}8$  mm; perianth tubes green, relatively robust in width, 6–7.5 cm; staminal cup white with a small yellow-green eye, rotate at peak anthesis, shortly tubular below,  $3\text{--}4 \times 4.8\text{--}5.5$  cm; margin irregularly dentate between the free filaments; free filaments suberect, inserting on a flat sinial base, white, 2.5–3.5 cm; anthers 1.5–2 cm, pollen golden; styles green in distal third, fading to white, 14–15 cm; ovaries ovoid, ca. 1 cm  $\times$  5–7 mm; ovules 2 or 3 per locule. Fruits, subglobose to broadly trilobular,  $2\text{--}2.5 \times 2\text{--}3$  cm. Seeds obovoid,  $1.6\text{--}3.2 \times 1\text{--}1.9$  cm. Chromosomes  $2n = 44$  (34 2-armed and 10 telocentric chromosomes).

**Distribution and ecological associates.** *Hymenocallis gholsonii* is a rare endemic with localized populations along one stream and its branches near Sumatra in the Apalachicola National Forest. The new species is found in association with the following herbaceous plants: *Carex folliculata* L., *Dichantherium scabriusculum* (Elliott) Gould & C. A. Clark, *Eriocaulon decangulare* L., *Juncus polycephalus* Michaux, *Orontium aquaticum* L., *Pluchea* Cassini, *Pontederia cordata* L., *Rhynchospora microcarpa* Baldwin ex A. Gray, *Rhynchospora* Vahl, and *Sphagnum* L. Shrubs, vines, and trees include: *Acer rubrum* L., *Arundinaria gigantea* (Walter) Muhlenberg, *Cephalanthus occidentalis* L., *Chamaecyparis thyoides* (L.) Britton, Sterns & Poggenburg, *Cyrilla racemiflora* L., *Hypericum fasciculatum* Lamarek, *Quercus laurifolia* Michaux, *Smilax laurifolia* L., and *S. walteri* Pursh.

**IUCN Red List category.** *Hymenocallis gholsonii* is currently known from two locations in the same stream system. Its known area of occurrence is much smaller than 20 km<sup>2</sup>. Both locations are in the Apalachicola National Forest and are therefore protected from many threats. Nevertheless, the species is so restricted that small disturbances can affect a large

proportion of the entire population, causing it to become critically endangered or even leading to its extinction. The major plausible threat to this species is disturbance of habitat by road construction or maintenance; unauthorized collecting of bulbs may also be a threat to these showy plants. We therefore believe that this species should be considered Vulnerable (VU) according to criterion D2 in the IUCN Red List assessment: "Population with a very restricted area of occupancy (typically less than 20 km<sup>2</sup>) or number of locations (typically five or fewer) such that it is prone to the effects of human activities or stochastic events within a very short time period in an uncertain future, and is thus capable of becoming Critically Endangered or even Extinct in a very short time period" (IUCN, 2001).

**Etymology.** It is with great pleasure that we name this new spider lily in honor of Angus K. Gholson, the 2007 recipient of the Elizabeth Ann Bartholomew Award presented by the Southern Appalachian Botanical Society. He has encouraged and supported

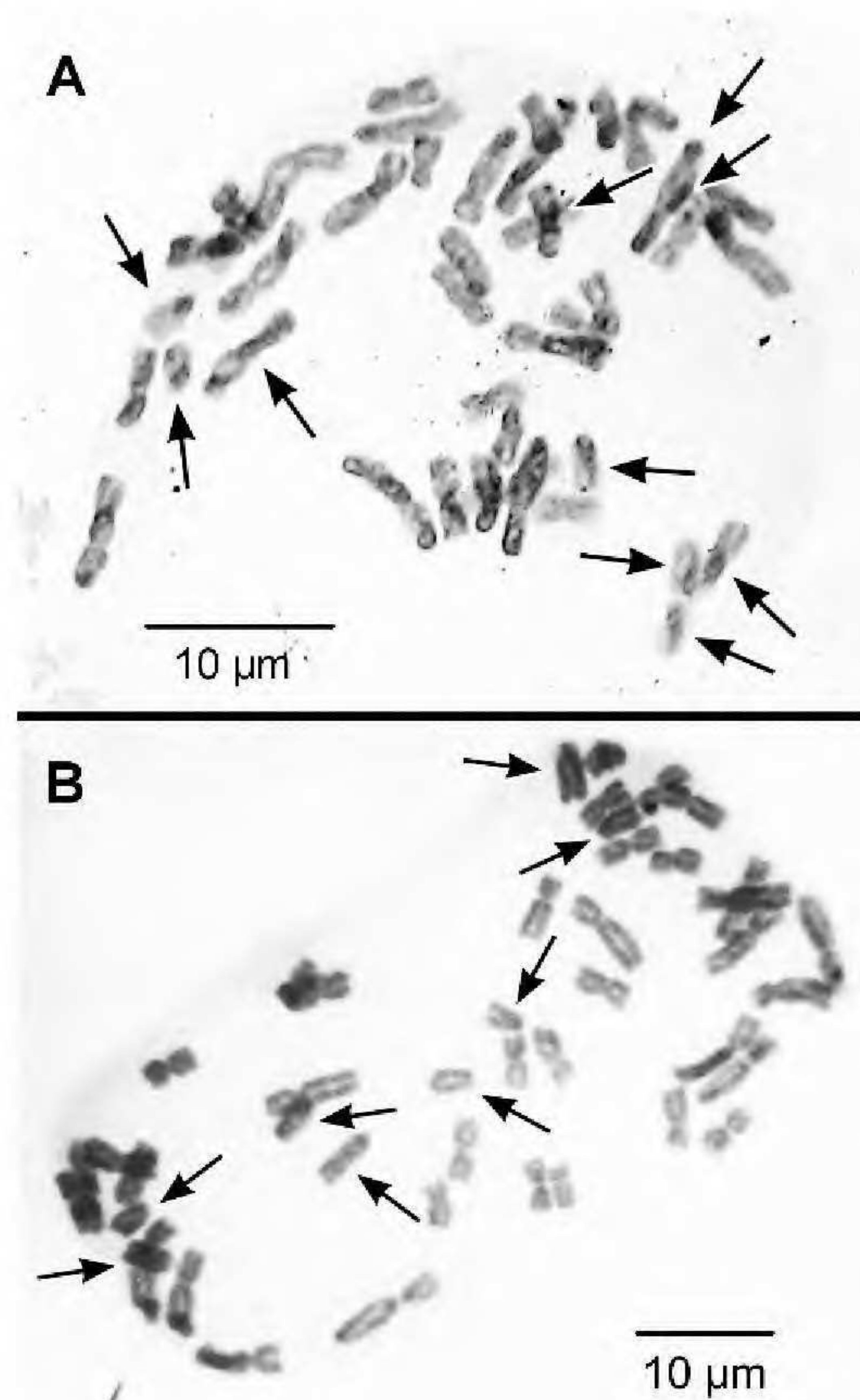


Figure 2. —A. Somatic chromosomes of *Hymenocallis gholsonii*,  $2n = 44$ , from Smith & Garland 1784. Arrows point to 10 telocentric chromosomes. —B. Somatic chromosomes of *Hymenocallis choctawensis*,  $2n = 44$ , from Smith & Garland 1432 (FSU). Arrows point to 8 telocentric chromosomes.



our spider lily studies by always making available his herbarium in Chattahoochee, Florida, by assisting in the field, and by sending the senior author bulb and seed collections. Sometimes field trips were made with the late Robert K. Godfrey. A field day with “the dynamic Florida Panhandle duo of Gholson and Godfrey” was always highly regarded and long-remembered!

**Cytology.** The senior author analyzed the chromosome number and karyotype of mitotic cells in actively growing root tips from potted bulbs. The cytological techniques were those developed by Walter Flory and his graduate students at the Blandy Experimental Farm of the University of Virginia as outlined by Flory and Smith (1980) and by Smith in Jones and Luchsinger (1986). Well-spread metaphase figures were examined with a Wolfe microscope and photographed with a Canon digital camera.

Figure 2A represents a well-spread chromosomal figure of *Hymenocallis gholsonii*. The somatic count is  $2n = 44$ . This number is not entirely unexpected, because we consider this taxon to be allied to *H. choctawensis*, also  $2n = 44$  (Fig. 2B). However, the karyotype of *H. gholsonii*, unlike that of *H. choctawensis*, consists of 10 telocentric chromosomes rather

than 8, and the number of 2-armed chromosomes is 34 rather than 36. The karyotype of *H. gholsonii* is unique among the 16 U.S. *Hymenocallis* species for which karyotypes have been developed (Flory, 1976, 1978; Smith & Flory, 1990; Smith & Darst, 1994; Smith & Garland, 1996; Smith et al., 2001). *Hymenocallis gholsonii* likely evolved from *H. choctawensis* by the process of centric fission, which is discussed by Flory (1976) as a dynamic cytological process leading to speciation in *Hymenocallis*.

Our studies have revealed that *Hymenocallis gholsonii* is a rare endemic in scattered populations along a stream and its branches in the Sumatra area of the Apalachicola National Forest of the Florida Panhandle. We recognize it to be morphologically distinctive from all other known spider lilies in the southeastern United States based on its bulb type, leaves, and flowers with robust, stocky perianth tubes and rotate staminal cup at peak anthesis (Smith & Garland, 2007). Supporting the morphological distinctions is a unique karyotype.

**Paratypes.** U.S.A. **Florida:** Liberty Co., stream in the Sumatra area, Apalachicola National Forest, 22 May 2005, G. L. Smith & M. Garland 1784 (FLAS, FSU, MO); 17 May 2006, G. L. Smith, A. K. Gholson, M. Darst, G. Anglin & B. Niedenberger 1786 (HPU).

#### KEY TO *HYMENOCALLIS* SPECIES IN THE FLORIDA PANHANDLE

- 1a. Ovules 1 to 3(to 4) per locule; ovary 0.7–1.5 cm × 5–10 mm.
  - 2a. Bulb non-rhizomatous; leaves glaucous . . . . . *H. occidentalis*
  - 2b. Bulb rhizomatous; leaves shiny.
    - 3a. Scape bracts linear to narrowly lanceolate, width chiefly < 10 mm at widest point . . . . . *H. duvalensis*
    - 3b. Scape bracts lanceolate, width chiefly > 10 mm at widest point.
      - 4a. Leaves liguliform to narrowly oblanceolate.
        - 5a. Scape bracts 3–4(–4.5) × 1–1.5 cm; bulbs 2.5–4 cm long . . . . . *H. franklinensis*
        - 5b. Scape bracts 4–5 × 1.5–2 cm; bulbs 4.5–7.5 cm long . . . . . *H. gholsonii*
      - 4b. Leaves distinctly oblanceolate . . . . . *H. choctawensis*
- 1b. Ovules 4 to 8 per locule; ovary 1.4–3 cm × 6–15 mm.
  - 6a. Tepals yellow-green to green; bulb non-rhizomatous . . . . . *H. henryae*
  - 6b. Tepals white; bulb rhizomatous.
    - 7a. Staminal cup rarely wider than 6 cm; longest leaf not exceeding 4 dm at peak anthesis. . . . . *H. godfreyi*
    - 7b. Staminal cup 6 cm or wider; longest leaf greatly exceeding 4 dm at peak anthesis . . . . . *H. rotata*

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